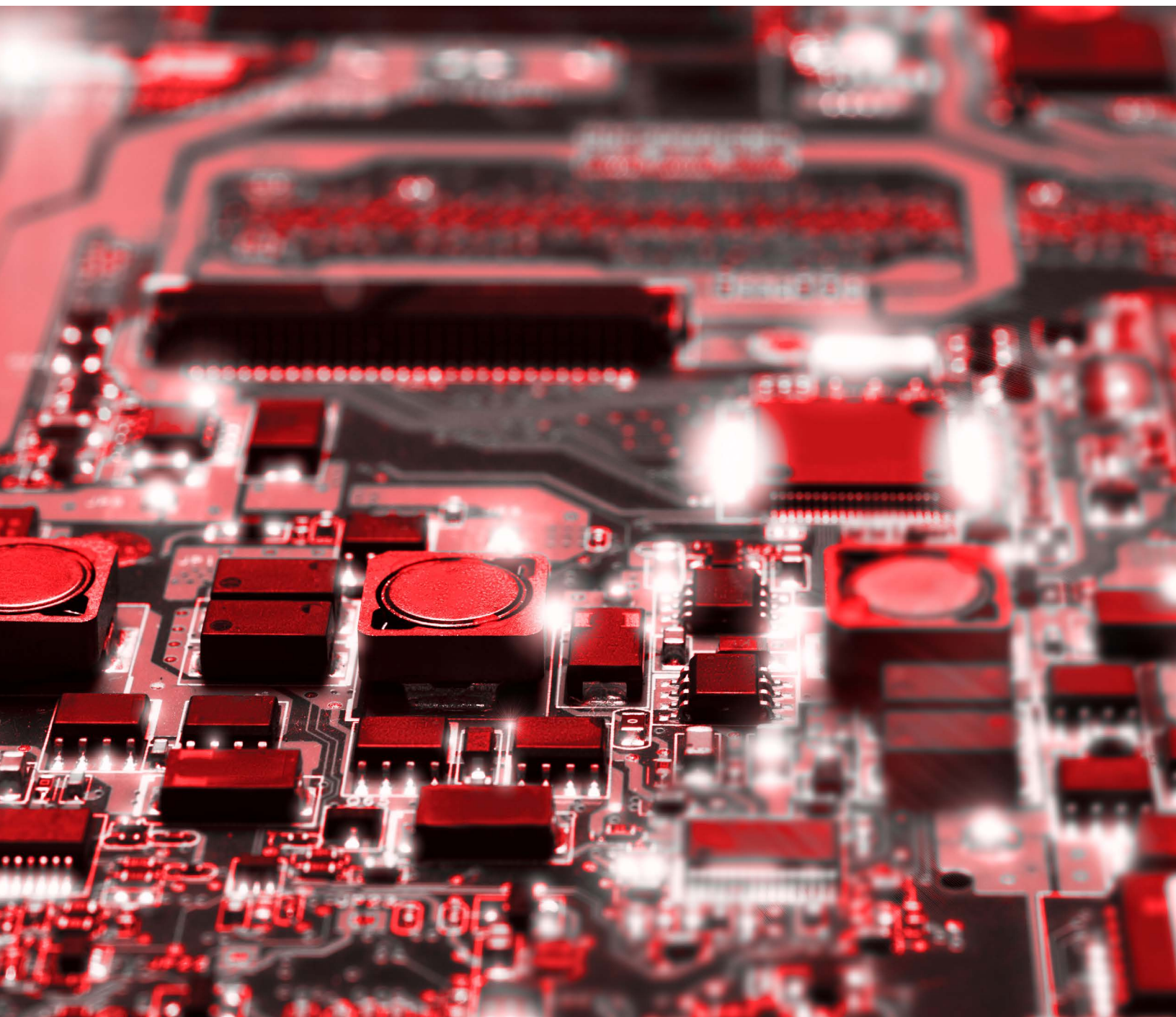


HotSwitch®

Enhanced system protection solutions against transient and steady-state fault conditions



HotSwitch®

HotSwitch is an integrated power switch to turn a load on and off. The HotSwitch turns on or off the current flow to a power rail as needed by the application. But turning on and off a load is not the only task a HotSwitch performs.

Semtech's HotSwitch is connected with the main power rail to protect the electronics system against typical electrical transients and steady-state fault conditions. The device detects electrical surges and provides robust security to the downstream subsystem by gracefully disconnecting the load from the power source.

The HotSwitch portfolio provides an enhanced shield against inrush current, overvoltage, under voltage, reverse current, short circuit, and over-temperature faults. These devices minimize the on-resistance of the MOSFETs and provide enhanced switching performance with low conduction loss.

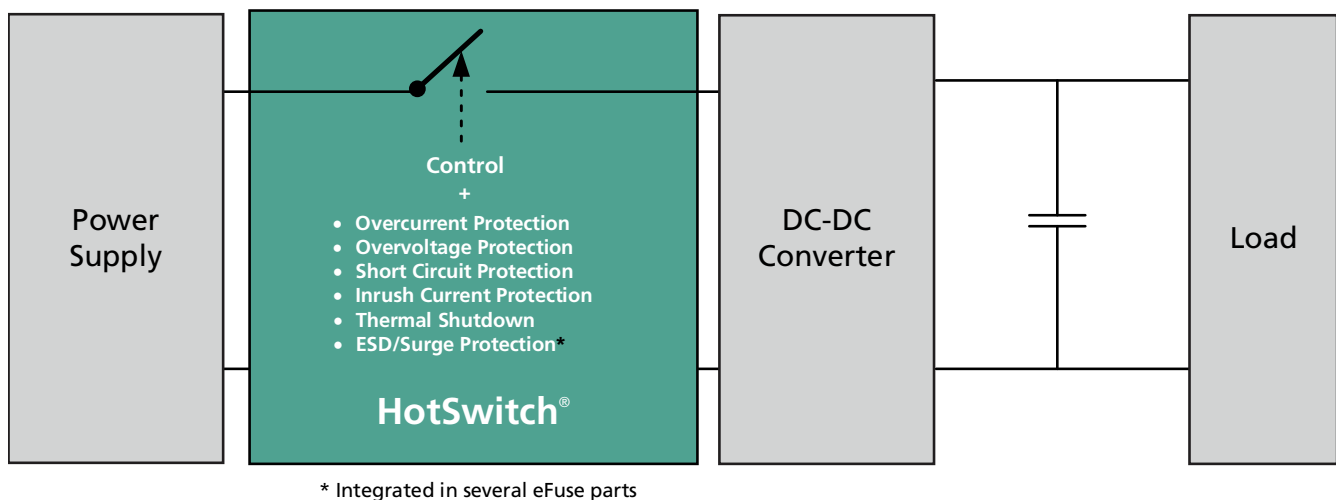


Figure 1. Concept of a HotSwitch®

HotSwitch® Ordering Information								
Part Number	Iq Typ (µA)	Shutdown Current Typ (µA)	Over-Current Protection, Y/N	Current Limit (Fixed/Adj)	UVLO/Over-Voltage Protection (Y/N)	Fault Signal (Y/N)	Soft Start	IEC61000-4-2 (ESD) contact Rating (+/-kV)
HS2950P	340	1	Yes	Adj	Yes	Yes	Adj	
HS2240P	200	2	Yes	Fixed	Yes	Yes	Adj	12

Part Number	IEC61000-4-2 (ESD) air Rating (+/-kV)	ESD protection level HBM (kV)	IEC 61000-4-5 (Lightning) (8/20µs)	Package	Package Size (mm)	Quantity per Reel	Reel Size
HS2950P		2	NA	DFN-12 lead	3.0x3.0x0.55	5000	13"
HS2240P	20	2	40A	DFN-14 lead	3.5x2.0x0.57	3000	7"

Basic Features

Over Current Protection

When an over-current condition occurs, the HotSwitch usually limits the load current to the limit set by an external resistor, R_{LIM} . If the over-current condition persists, the device disconnects the load until it recovers. Some HotSwitch parts also use a fixed current limit and do not use any external resistor.

Over-Voltage Protection

A HotSwitch features adjustable over-voltage protection thresholds using external programming resistor network. If the input voltage exceeds the over-voltage threshold, the HotSwitch turns off the switch and prevents start-up. The over-voltage response time is critical to prevent the load from being damaged. It is essential to turn off the switch in less than 100ns.

Undervoltage lockout

HotSwitch turns off the switch and disconnects the load from the supply if the input voltage drops below the UVLO threshold. The under-voltage condition can malfunction the internal circuitry by partially turning the FET on/off or sending incorrect signals to the control circuit.

Soft-Start

HotSwitch provides a controlled ramp-up of the output voltage during start-up, which minimizes the inrush current, and protects the load and the power supply from overloading. The soft start duration can be set up by adding an external capacitor to the SS pin.

Enable Pin

The enable pin is used to turn on/off the HotSwitch. If the device features a high enable (EN) pin, the part is enabled by pulling higher than a specific small voltage. The HotSwitch can be disabled when a fault condition occurs.

Fault Pin

The fault (FLT) pin indicates any abnormal condition such as OCP, OVP, UVLO, or short circuit event. During any of these events, the FLT pin is pulled high. When the fault is apparent, the FLT pin returns to low.

Thermal Shutdown Protection

HotSwitch features thermal shutdown protection to prevent the part from overheating. The part turns off and asserts a fault flag when detecting the junction temperature above a specific limit. The part remains in thermal shutdown mode until the junction temperature cools down to the predetermined value.

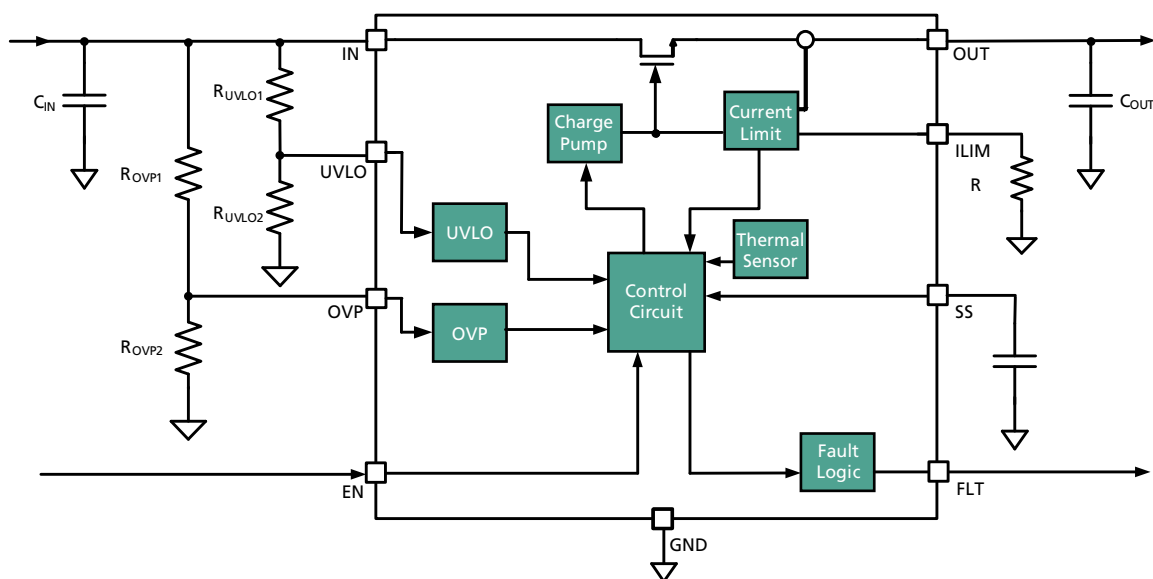


Figure 2. Basic Features of a HotSwitch®

Why HotSwitch®

HotSwitch brings substantial performance advantages, protecting circuits from transient and steady-state conditions:

- Integrated protection circuitry that can replace conventional fuses and other protection devices
- Ensures longer battery life for systems with low leakage and quiescent currents
- Delivers higher system reliability with safety features like over-current, over-voltage, over-temperature, and reverse current blocking
- Provides lower BOM count and smaller PCB area than discrete or multi-chip solutions
- With enhanced system dynamic behaviors, including limited inrush current, proper loading sequence, handling minor disturbances in a system power line, and injecting lesser interference among loads
- Embeds IEC 61000-4-2 level compliant ESD and surge protection for some applications

Enterprise

Industrial

Appliances

Motor

Consumer



Servers



Storage



HDD



SSD



Sound Cards



POS Terminals



Industrial Printer



Inkjet Printer



PLC



Low-end Robotics



Automation



3D Printer



Dishwasher



Thermostats



Surveillance Camera



Vending Machine



Portable Refrigerator



E-Scooter



Drilling Machine



Blower



Air Compressor



Electric Saw



USB-PD



Headphone



Drones



Power Bank

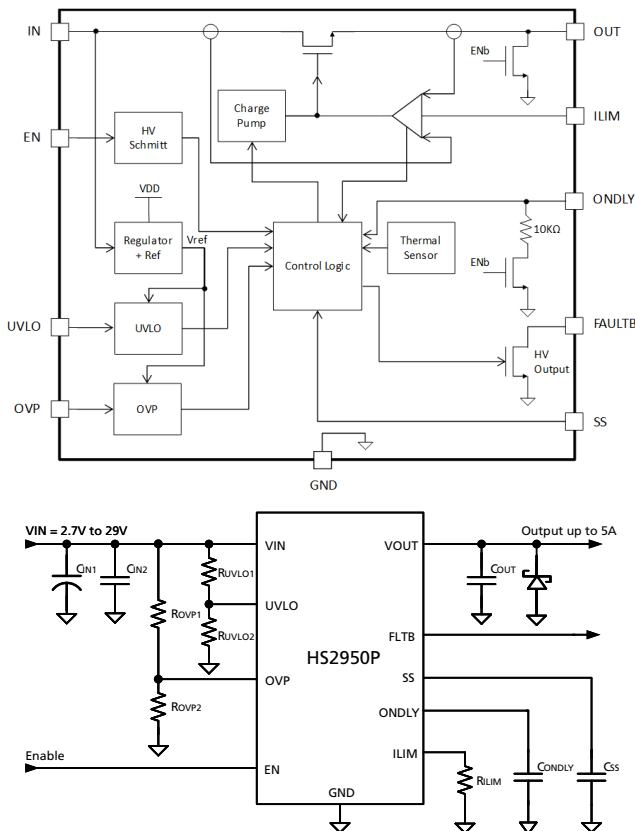
HotSwitch® Products

29V 5A Load Protection HotSwitch

- Vin: 2.7V–29V
- Up to 5A DC Output Current
- Low $R_{DS(on)}$: 25m Ω
- Adjustable current limit
- Adjustable UVLO and over-voltage protection
- Automatic output discharge
- Programmable soft-start
- Fault flag
- Thermal shutdown protection
- DFN 3.0 x 3.0 x 0.55mm

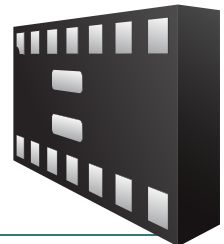


HS2950P

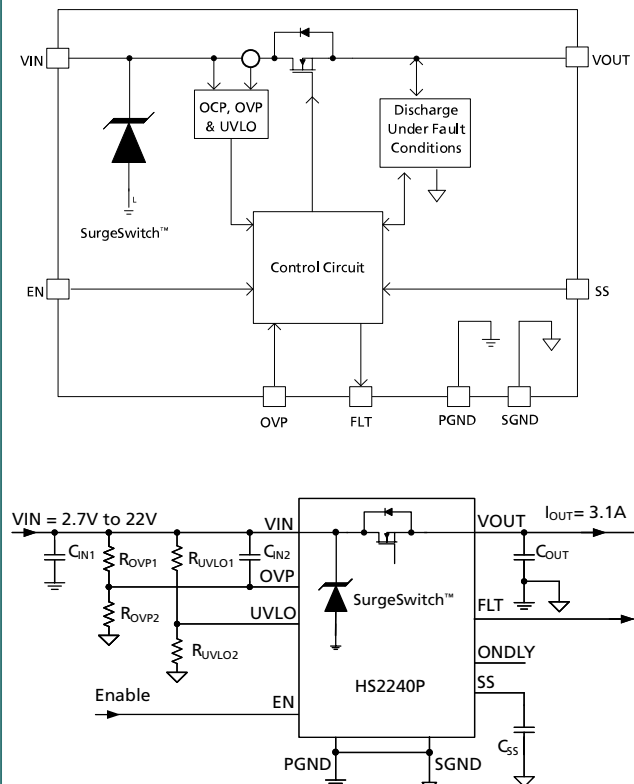


eFuse with Integrated SurgeSwitch™ Protection

- Vin: 3.0V–22V Up to 5A DC Output Current
- Up to 3.1A DC Output Current
- Low $R_{DS(on)}$: 40m Ω
- Adjustable UVLO and over-voltage protection
- Automatic output discharge
- Programmable soft-start
- 40A I_{pp} (tp=8/20us) per IEC 61000-4-5
- ± 20 kV / ± 12 kV (air/contact) per IEC 61000-4-2
- Fault flag
- Thermal shutdown protection
- DFN 3.5 x 2.0 x 0.57mm



HS2240P





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